



STATE OF MICHIGAN  
DEPARTMENT OF STATE  
LANSING

## CONTENTS OF THIS PACKET

This packet contains the following information regarding mechanic testing, certification, and trainee permit:

- Information for the Mechanic Trainee
- Locating Secretary of State Branch Offices & Test Tips
- Mechanic Certification Frequently Asked Questions
- Mechanic Study Guides

Read the information in this packet carefully. Then, if you have further questions about the materials, contact the Business Licensing Section at 1-888-SOS-MICH (1-888-767-6424).

### INFORMATION FOR THE MECHANIC TRAINEE

There are two ways a person can obtain the skills needed to be a mechanic. The first is by going to a school which offers automotive training. This usually includes hands-on learning along with classroom studies. The other way is by working at a repair shop with an experienced mechanic who can teach proper repair methods and see that the work done by the trainee is correct.

Most good mechanics have learned their trade by both schooling and experience on the job. Today's cars and trucks are becoming more and more complicated to repair. This means that both training and experience are more important than ever to the person who wants to earn a living as a mechanic.

If you are currently performing major repairs on motor vehicles in Michigan, you must be a certified mechanic or hold a valid trainee permit.

A mechanic trainee permit is valid for a period of two years from the date of issue in the major repair categories listed on the permit. A permit may not be renewed. Upon expiration of the trainee permit, a mechanic trainee must either become certified or stop performing repairs in the categories listed on the permit.

A mechanic trainee may perform repairs only in the categories listed on the permit under the supervision of a mechanic who is currently certified by the State of Michigan in those repair categories.

A mechanic trainee should display his or her trainee permit in a conspicuous location, and when a mechanic trainee works on a motor vehicle, his or her name and trainee permit number must appear on the customer's final invoice. The name and certification number of the supervising mechanic must also appear on the final invoice. It is the responsibility of trainees and certified mechanics to ensure that their names and numbers are not used inappropriately by their employers.

The Office of Investigative Services may act to suspend or revoke a mechanic trainee permit if a trainee misrepresents the need for repairs, performs unnecessary repairs, or makes false or misleading statements in connection with a diagnosis or repair. In addition, a mechanic trainee may be required to obtain additional training or discontinue performing certain repairs if it is determined that the mechanic or trainee disregarded or departed from accepted industry repair standards.



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## MECHANIC TESTING OFFERED AT SELECTED SECRETARY OF STATE BRANCH OFFICES

The Office of Investigative Services offers mechanic tests at Secretary of State branch offices around the state with at least one branch in every county. To schedule an appointment at a branch office, access the Secretary of State main page at [Michigan.gov/sos](https://Michigan.gov/sos) and select, *Schedule an office visit*.

### Test Tips:

- The State mechanic tests contain multiple choice questions and are intended to measure the minimum competencies necessary to work in a particular area of study. An individual's ability to pass an exam depends on the amount of knowledge the person has covering a specific area, and how the individual interprets the test items. All tests are closed-book format. No reference materials or electronic devices may be used during testing. Absolutely no copying of examination items is permitted. Before taking tests, keep these tips in mind:
- Prepare in advance. It is suggested that individuals reference the **State Mechanic Study Guides** in preparation of any one test. Study guides provide a listing of the primary categories that would be found in a specific specialty area of study along with the specific sub-category subjects that will make up the test. Each test primary category is also broken down into percentages of questions asked therefore allowing the individual the ability to focus more heavily on specific areas of the test.
- Read each question carefully, including **ALL** the answers, so that you understand **exactly** what is being asked.
- Answer the questions based **ONLY** on the choices given. Don't try to "read into" the question or add information that is not provided. For many individuals, this is where they fail to answer the question correctly.
- Don't spend too much time on any one question. Try to narrow down your choices and select the answer you think is most likely correct. Chances are your first guess is the most correct!
- Answer every question.

## Important Reminders:

- The State of Michigan does not provide or recommend any single educational textbook or publishing materials for the mechanic certification categories. However, it is recommended that individuals who prefer home study acquire textbooks like those found in technical skill centers, and two or 4 four-year colleges.
- All motor vehicle mechanics performing major repairs for compensation must be certified by the Michigan Department of State in the categories for which they perform repairs. A person who is not certified may obtain a trainee permit.
- A mechanic trainee permit is valid for a period of two years from the date of issue in the major repair categories listed on the permit. A permit may **not** be renewed. Upon expiration of the trainee permit, a mechanic trainee must either become a certified Michigan mechanic or stop performing repairs in the categories listed on the permit. A mechanic trainee may perform repairs only in the categories listed on the permit under the supervision of a mechanic who is currently certified by the State of Michigan in those repair categories.

Further questions regarding mechanic testing may be directed to the Business Licensing Section:

Email: [Licensing@Michigan.gov](mailto:Licensing@Michigan.gov)

Telephone: 1-888-SOS-MICH (1-888-767-6424)

# MECHANIC FREQUENTLY ASKED QUESTIONS

## MECHANIC CERTIFICATION

1. Where can I obtain more information on becoming a certified mechanic in Michigan?

**Answer:**

Additional information is available under "[Mechanics](#)" on the Department of State website under Industry Services.

2. Who must be a certified mechanic?

**Answer:**

You must be certified as a mechanic in Michigan if you repair motor vehicles for compensation, including the reconditioning, replacement, diagnosis, adjustment, or alteration of the operating condition of the vehicle, or any component or sub-assembly in any category of major repair. If you perform major repairs and are not certified, you must get a mechanic trainee permit for those repair categories in which you work.

3. I have been told that I am exempt from having to become a certified or licensed mechanic in Michigan if I am currently certified by the National Institute for Automotive Service Excellence (ASE) in one or more categories. Is this true?

**Answer:**

No. ASE certification alone does NOT qualify you as a state certified mechanic in Michigan. However, you may be eligible to apply for state certification and transfer certain ASE categories to the application in lieu of taking state certification tests. Refer to the ASE Information page or contact the Business Licensing Section at 888-SOS-MICH (767-6424) for further information.

4. How do I become a certified mechanic?

**Answer:**

You must first pass a test for each repair category in which you want certification. Until you have passed the appropriate tests, you cannot apply for certification. A certification application will be included with the results letter if you successfully pass your test. Complete the application and return it with the \$25.00 application fee to:

Michigan Department of State  
Business Licensing Section  
Lansing, Michigan 48918

5. What does it cost to become a certified mechanic?

**Answer:**

The fee to become a certified mechanic is \$25. The annual renewal fee is \$20, or \$30 if received after the renewal date.

6. What are the motor vehicle repair categories which require state certification?

**Answer:**

The automobile and light truck repair categories for vehicles under 14,000 pounds GVW are:

1. Engine Repair
2. Engine Tune-up/Performance
3. Front End, Suspension & Steering Systems
4. Brakes & Braking Systems
5. Automatic Transmission
6. Manual Transmission, Front & Rear Drive Axles
7. Electrical Systems
8. Heating & Air Conditioning
9. Pre-1973 Vehicles

The heavy-duty truck repair categories for vehicles over 14,000 pounds GVW are:

1. Engine Repair - Gasoline
2. Engine Repair - Diesel
3. Drive Train
4. Brakes & Braking Systems
5. Suspension & Steering Systems
6. Electrical Systems

Repair categories for other on-road vehicles are:

1. Collision-Related Mechanical Repair
2. Unitized Body Structural Repair
3. Motorcycle
4. Recreational Trailer
5. BAIID -- Breath Alcohol Ignition Interlock Device

7. What is the difference between a "Master Mechanic" and a "Specialty Mechanic"?

**Answer:**

An individual certified in all of the first eight categories of Automobile and Light Truck Repair is a Master Automobile Mechanic. Similarly, a mechanic certified in all six categories of Heavy-Duty Truck Repair is a Master Heavy-duty Truck Mechanic. Individuals with a certification in Motorcycle are also given a master status. A mechanic certified in seven or fewer of the first eight categories under the automobile and light truck heading, or five or fewer of the six categories under the heavy-duty truck repair heading or in the 'other' category is considered a Specialty Mechanic.

8. Does a technician who only does "bench work" (such as rebuilding automotive parts or components) have to be certified?

**Answer:**

Yes. When bench work (the rebuilding, reconditioning, machining, or assembling of parts or components from a motor vehicle) is performed by a technician at a registered repair facility, the technician must be certified as a mechanic in the proper repair category. This work involves a diagnostic process that is directly related to the shop's regulated activities. The only time a bench mechanic need not be certified is when the employer is not required to be a registered motor vehicle repair facility. For example, in a parts store that does not operate a motor vehicle repair facility (does not diagnose vehicles and does not remove or install parts), the technician turning brake rotors or rebuilding engines need not be certified.

9. How do I renew my mechanic certification license?

**Answer:**

There are two options for renewing your mechanic license: online or by mail.

To [renew your mechanic certification online](#), go to the website and login.

To renew by mail, return your completed renewal application form and check or money order to:

Michigan Department of State  
Business Licensing Section  
Lansing, Michigan 48918

## **MECHANIC TESTING & REGISTRATION**

10. I have worked as a motor vehicle mechanic for many years. Do I have to take the mechanic tests?

**Answer:**

Yes, you must pass a test for each repair category in which you want to be certified. The law does not provide a "grandfather clause." The only way to qualify for state certification is to pass the state test or if you have passed tests administered by the National Institute for Automotive Service Excellence (ASE), you may be eligible to apply for state certification in certain automobile and heavy duty truck categories without further testing. **ASE certification alone does NOT qualify you as a state certified mechanic.** Visit the [ASE to State of Michigan Exam Conversion Table](#) page or contact the Business Licensing Section at 888-SOS-MICH (767-6424) for further information.

11. Where can I take the mechanic tests?

**Answer:**

Motor vehicle mechanic tests are available at Secretary of State offices throughout the state. To obtain branch office location information (address or business hours), visit the Michigan Department of State Branch Office Locator. You will be required to pre-register prior to taking a test. There is a \$6 fee for each test. Tests are offered on a first-come, first-serve basis. Tests are not available within one hour of closing.

12. Are the state tests offered in written or electronic format?

**Answer:**

State mechanic tests are offered electronically at a kiosk with a touch screen.

13. Will I need to pre-register to take a mechanic test?

**Answer:**

No. Pre-registration is recommended but not required. Only Michigan residents can pre-register and all other testers must purchase tests at the branch office. Register here for your mechanic test: [Sign Up for Mechanic Testing](#). The online system is available 24 hours a day, seven days a week.

14. Will I need to bring anything with me to the testing location once I have registered?

**Answer:**

Yes, you will need to bring a copy of your mechanic payment receipt containing your confirmation number, along with a driver's license or state identification card containing your photograph to the mechanic testing location.

15. Once I have registered for a test, is there a time limit for taking the test?

**Answer:**

Yes, you have 180 days from the registration date to complete your test. After 180 days, the test will expire, and a refund will not be provided. Re-registration will be required at an additional fee of \$6 per test.

16. Will registering for a test require me to select a specific test location?

**Answer:**

No, you may test at any Secretary of State office in the state.

17. How will I be notified of my test results?

**Answer:**

You will be notified of your pass/fail status on the kiosk screen when you complete the test. For all testing formats, a detailed test result letter will be mailed within seven days of completing your test.

18. What is the minimum score needed to pass a test?

**Answer:**

Passing scores vary by test, and the number required to pass a test will display on the testing screen.

19. In what format are the test questions delivered?

**Answer:**

The mechanic tests contain multiple-choice questions.

20. How many questions are on each test?

**Answer:**

Most tests have roughly 55 questions. The Motorcycle and Auto/LT Pre-1973 are closer to 100 questions.

21. Can a person who has a disability or difficulty with the English language take the mechanic tests?

**Answer:**

Yes, visit the following webpage, [Mechanic Testing](#), and look for "Testing Accommodations" under the Mechanic testing process section.

22. I took the state mechanic test and did not pass. Can I take the test again and will I have to pay the test fees again?

**Answer:**

Yes, but you may only take each test once per day. You must pay the \$6.00 test fee for each test you retake.

23. Does the state provide study materials or textbooks for my use?

**Answer:**

Michigan does not provide or recommend any single textbook or published materials for your review when preparing for the mechanics tests. However, it is recommended that individuals who prefer home study acquire textbooks similar to those found in technical skill centers, and two- or four- year colleges.

It is suggested that you prepare by reviewing the Mechanic Study Guides. These study guides provide a list of the categories and subcategories that will be on each test. Each category is given a percentage indicating how many of the test questions will be drawn from that category. This allows you to plan your study time and concentrate on those areas that are given the most emphasis on the test.

## **MECHANIC TRAINEE PERMIT**

24. What is a mechanic trainee permit?

**Answer:**

The mechanic trainee permit makes it possible for the non-certified mechanic to work at a repair facility. A mechanic trainee employed by a repair facility must work under the direct supervision of a certified specialty or master mechanic.

25. How do I apply for a mechanic trainee permit?

**Answer:**

You must complete an Application for Motor Vehicle Mechanic Trainee Permit. The application is available online here: [Online Mechanic Trainee Application](#), or at the Department of State website at: [Mechanic Trainee Permit](#). Paper applications should be returned with the \$20.00 application fee to:

Michigan Department of State  
Business Licensing Section  
Lansing, Michigan 48918

**Note:** No fee is required if you are a state-certified mechanic with an unexpired certificate.

26. What are the repair categories for a mechanic trainee?

**Answer:**

The mechanic trainee categories are the same as those for mechanic certification. You may obtain a trainee permit in any number of categories of repair but cannot remain a mechanic trainee in any single repair category for more than two years. Once expired, trainee permits may not be reissued.

## **MECHANIC RECERTIFICATION REQUIREMENTS**

27. What is mechanic recertification?

**Answer:**

If you are an automotive and light truck mechanic certified in Engine Tune-up/Performance, Electrical Systems or Brakes and Braking Systems, you must comply with one of the following requirements for continuing certification. Certificates in the three categories noted are good for five years and must be renewed before their expiration date. All other repair categories are valid for life once issued.

- Pass the latest state mechanic certification test, or
- Show proof of current and appropriate National Institute for Automotive Service Excellence (ASE) certification, or
- Successfully complete a state-approved training program.

To maintain certification in these categories, mechanics must comply with the recertification requirement before their certification expiration date, according to the schedule below:

<b>Mechanic Category</b>	<b>Recertification Year</b>	<b>Ongoing Recertification Renewal</b>
Engine Tune-up/ Performance	2018	2018, 2023, 2028
Electrical Systems	2019	2019, 2024, 2029
Brakes & Braking Systems	2020	2020, 2025, 2030



For example, John Brown's mechanic certificate expires each year on July 16. John last recertified his Engine Tune-up/Performance certificate on July 16, 2018, making his next recertification date July 16, 2023. He last recertified in Electrical Systems July 16, 2019, so he'll have to recertify again in July 16, 2024. He'll have until July 16, 2020 to recertify in Brakes & Braking Systems after meeting the requirements on July 16, 2025.

**If you have additional questions about the Michigan mechanic certification program or requirements, contact:**

Michigan Department of State  
Business Licensing Section  
Lansing, MI 48918-1210  
Telephone: 1-888-SOS-MICH (1-888-767-6424)

# MECHANIC STUDY GUIDES

## Automobile & Light Truck

(Vehicles under 14,000 lbs. GVW)

* Engine Repair .....	1
* Automatic Transmission .....	2
* Manual Transmission, Front & Rear Drive Axles .....	3
* Front End, Suspension & Steering Systems .....	4
* Brakes & Braking Systems.....	5
* Electrical Systems.....	6
* Heating & Air Conditioning .....	7
* Engine Tune-up/Performance .....	8
*Unitized Body & Structural Repair.....	9
*Collision-Related Mechanical Repair .....	10
Breath Alcohol Ignition Interlock Device (BAIID) .....	13

## Heavy-Duty Truck (HDT)

(Vehicles 14,000 lbs. GVW and higher)

*Engine Repair – Gasoline .....	14
*Engine Repair – Diesel .....	15
*Drive Train.....	16
*Brakes & Braking Systems.....	17
*Suspension & Steering Systems.....	18
*Electrical Systems.....	19

## Miscellaneous

*Motorcycle Repair .....	11
Recreational Trailer .....	12

**\* Denotes tests that have been recently updated.**

# Mechanic Study Guide

## Engine Repair

### Automobile & Light Truck Repair

#### **Engine Fundamentals - 12%**

- Micrometer reading
- Bolt head markings
- Engine R&R procedures
- Engine break in

#### **General Engine Diagnosis - 28%**

- Oil consumption
- Cylinder leakage test
- Compression test
- Exhaust recognition
- Engine sludge/contamination
- Vacuum testing
- Crankcase pressure/blow-by
- Spark plug diagnosis
- Engine noise
- Power balance testing

#### **Engine Block Diagnosis and Repair - 22%**

- Engine measurements and clearances
- Piston installation
- Cleaning and assembling procedures
- Piston design
- Piston ring diagnosis
- Cam bearing installation

#### **Cylinder Head and Valve Train Diagnosis & Repair - 28%**

- Valve deposits
- Valve train measurements and clearances
- Mechanical timing
- Variable lift valves
- Variable cam timing
- Variable displacement
- Valve guide wear
- Valve spring diagnosis
- Noise diagnosis
- Camshaft diagnosis

#### **Lubrication and Cooling - 10%**

- Cooling system diagnosis
- Oil pressure diagnosis
- Fluid identification

The State of Michigan does not provide or recommend any single textbook or published materials for your review when preparing for the mechanics tests. However, it is recommended that individuals who prefer home study acquire textbooks similar to those found in technical skill centers, and two- or four-year colleges. Typically, these types of textbooks are not found at your local library but are available through educational bookstores and various online automotive publishers.

It is suggested that you prepare by reviewing the Mechanic Study Guides. These study guides provide a list of the categories and subcategories that will be on each test. Each category is given a percentage indicating how many of the test questions will be drawn from that category. This allows you to plan your study time and concentrate on those areas that are given the most emphasis on the test.

# Mechanic Study Guide

## Automatic Transmission

### Automobile & Light Truck Repair

#### **Internal Operation – 26%**

- Gear train end play
- Band and servo operation
- Planetary gear set
- Multiple disc clutch packs
- Shifting operation
- Torque converter
- Valve body
- Transmission inputs
- Electrical/Electronics

#### **General Diagnosis - 31%**

- Shift quality
- Fluid diagnosis
- Band / clutch diagnosis
- Fluid loss diagnosis
- Pressure testing
- Valve body diagnosis
- Scan tool usage
- External control
- Transmission noise
- Transmission performance

#### **Component Diagnosis - 12%**

- Hydraulics
- Torque converter
- Clutch pack
- Cooler operation
- Solenoid operation and testing

#### **Repair Procedures 13%**

- Transmission remove & replace
- Transmission seals
- Pump to converter engagement
- Pump operation
- Programming / calibration

#### **Fundamentals- 18%**

- Fluids
- Transaxle
- Valve body components
- General transmission operation
- Start / stop operation
- High-voltage safety
- Valve identification Fluid types

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# Mechanic Study Guide

## Manual Transmission, Front & Rear Drive Axles

### Automobile & Light Truck Repair

#### **Transmission/Transaxle Diagnosis - 13%**

Fluid and transmission diagnosis  
Hard shifting complaints  
Transmission vs. transaxle comparison  
Transaxle/Transmission gear recognition  
Synchronizer problems & operation

#### **Clutch Diagnosis & Repair – 19%**

Clutch disc operation  
Noise and chatter diagnosis  
Shifting problem diagnosis  
Hydraulic systems

#### **Component R & R - 10%**

Transmission remove and replace  
Extension housing seal remove & replace  
Synchronizer replacement  
Electronic manuals

#### **Final Drive - 30%**

Ring gear run-out  
Noise diagnosis  
Differential diagnosis  
Ring & pinion gear sets  
Ring & pinion backlash  
Pinion bearing pre load  
Final drive ratio  
Pinion seal remove & replace  
Limited slip diagnosis  
Differential bearing pre load  
Lubricant types

#### **Axle Shaft/CV Repair - 9%**

CV boot installation  
Drive axle diagnosis  
CV joint operation

#### **4WD/AWD Systems – 9%**

Transfer case operation  
4WD actuators  
AWD operation

#### **Miscellaneous - 10%**

Bearing types  
Gear type identification  
Direct drive and gear reduction theory  
Driveshaft angle

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**Mechanic Study Guide**  
**Front End, Suspension & Steering Systems**  
**Automobile & Light Truck Repair**

**Alignment - 32%**

Alignment procedures  
Vehicle pull diagnosis  
Alignment diagnosis  
Steering wheel center  
Caster adjustment  
Camber adjustment  
"Toe" adjustment procedures

**Suspension - 29%**

Ball joint diagnosis  
Measuring curb height  
Ball joint remove and replace (R&R) procedure  
Strut suspensions  
Electronic suspension  
Suspension symptom diagnosis  
Component wear

**Steering - 20%**

Rack & pinion diagnosis  
Electric power steering  
Tie rod end diagnosis  
Steering linkage diagnosis  
Hydraulic power steering

**Fundamentals - 18%**

Lug nut torque  
Wheel bearing adjustment  
Basic alignment angle understanding  
Tire wear

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# Mechanic Study Guide

## Brakes & Braking Systems

### Automobile & Light Truck Repair

#### **System Diagnosis and Repair - 26%**

- Hydraulic valves
- Brake pedal pulsation
- Brake performance
- Wheel bearings
- Power assist systems
- Fundamental procedures
- Noise diagnosis

#### **Hydraulics Diagnosis and Repair - 23%**

- Fluid diagnosis
- Line repair
- Hydraulic repair
- Brake pedal feel
- Brake bleeding
- Leak diagnosis

#### **Electronic Brake System Diagnosis & Repair - 26%**

- ABS pump / motor operation
- Safety precautions
- Speed sensors
- Braking electrical diagnosis
- Stability control systems

#### **Drum Brake Diagnosis & Repair - 12%**

- Measuring and refinishing
- Drum/Shoe types
- Brake adjustment
- Leak diagnosis
- Parking brake
- Brake hardware

#### **Disc Brake Diagnosis & Repair - 12%**

- Measuring and refinishing
- Caliper replacment
- Parking brake
- Brake hardware

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# Mechanic Study Guide

## Electrical Systems

### Automobile & Light Truck Repair

#### **Electrical Fundamentals - 25%**

- High voltage safety
- SIR (Supplemental Inflatable Restraint)
- Basic electrical
- Series circuit diagnosis
- Relay operation
- Circuit protection devices
- Networking and communication

#### **Testing Equipment Usage - 16%**

- Ohmmeter usage
- Voltmeter usage
- Ammeter usage
- Voltage drop
- High voltage systems

#### **Starting and Charging System Diagnosis - 19%**

- Batteries
- Starter diagnosis
- Starter current draw
- Starter circuit diagnosis
- Generator / alternator diagnosis
- Charging system output
- Charging system circuit diagnosis
- Voltage drop tests

#### **Circuit Diagnosis - 20%**

- Short to ground
- High resistance/open circuit
- Blower motor circuit diagnosis
- Lighting circuits
- Cooling fan circuit
- Warning circuits
- Accessory circuits

#### **Electrical Diagrams - 20%**

- Electrical circuit recognition
- Diagram usage

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# Mechanic Study Guide

## Heating & Air Conditioning

### Automobile & Light Truck Repair

#### **Heating & Engine Cooling System Diagnosis - 21%**

- Leak diagnosis
- Freeze protection
- Low heater output
- Pressurized systems
- Defrost operation
- Overheating

#### **General Knowledge of A/C Components & Their Functions - 19%**

- Receiver drier / accumulator
- Temperature sensors
- Refrigerant oil
- Compressor clutch
- Condenser
- Evaporator
- Orifice tube
- Thermostatic expansion valve

#### **General Knowledge of A/C Systems - 12%**

- Refrigerant types
- Refrigerant states
- Operating pressures

#### **A/C Diagnosis - 26%**

- Condensation
- Leak detection
- Overcharged/undercharged system
- Compressor clutch
- Gauge set readings
- Lack of cold air
- Electrical schematic interpretation
- Air delivery

#### **A/C Repair Procedures - 18%**

- Recovering refrigerant
- Seal replacement
- Compressor replacement
- Charging the system
- Component replacement

#### **Refrigerant Recovery, Recycling & Handling - 4%**

- Refrigerant environmental concerns
- Recycling or recovering refrigerant

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# Mechanic Study Guide

## Engine Tune-up/Performance

### Automobile & Light Truck Repair

#### **Electronic Controls - 29%**

- Programming / memory
- Fault codes
- Closed loop
- Sensor diagnosis
- Oxygen sensor operation
- Position sensor reading
- Multimeter usage
- Scan tool usage

#### **Ignition Systems - 13%**

- Timing recognition
- No spark diagnosis
- Causes of detonation
- Spark plug diagnosis

#### **Fuel System - 24%**

- Injector pulse width
- Fuel line replacement
- Fuel injection principals
- Causes of a rich mixture
- Causes of a lean mixture
- Fuel quality/content
- Turbocharger

#### **Diagnosis - 18%**

- Engine mechanical timing
- Circuit resistance checks
- Engine vacuum
- Catalytic converter
- Cylinder leakage
- Compression test

#### **Emission Control Systems – 16%**

- EGR operation
- Evaporative emission control system
- Catalytic converter
- General emissions

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# Mechanic Study Guide

## Unitized Body Structural Repair

### Automobile & Light Truck Repair

#### Materials

##### (Characteristics & Identification) - 17%

Aluminum  
UHSS (Ultra High Strength Steel)  
HSS (High Strength Steel)  
Plastics

##### Unitized Body General Understanding - 10%

Crush zones  
Design features which initiate the crush process  
Manufacturers' tolerances  
One-time fasteners

#### Material Joining – 23%

Flow drill screws  
Self piercing rivets  
Adhesives  
Characteristics of:  
MIG/GMAW  
STRSW/Spot welding  
TIG/GTAW  
Oxy/Acetylene  
Welding precautions  
Shielding gas

#### Repairing Structural Components - 21%

Structural component identification  
Sectioning  
Types of welds:  
Fillet  
Plug  
Butt with backing  
Open Butt  
Anchoring  
Corrosion protection

#### Glass Replacement and Installation – 5%

Types of glass

#### Measuring/Damage Analysis - 25%

Point to point  
Direct damage  
Indirect damage  
Primary damage  
Secondary damage  
Types of damage:  
Mash  
Sway  
Sag  
Twist  
Diamond  
Datum plane  
Vehicle centerline  
Asymmetrical dimensions

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# Mechanic Study Guide

## Collision-Related Mechanical Repair

### Automobile & Light Truck Repair

#### **Steering and Suspension - 13%**

Component identification  
Alignment adjustments  
Steering column diagnosis  
Rack & pinion  
Power steering

#### **Heating & Cooling - 10%**

General questions

#### **Electrical - 33%**

Wire repair  
Symbol identification  
Circuit diagnosis  
ADAS system  
Sensor diagnosis / repair  
Module replacement  
High voltage safety  
Airbag safety

#### **Restraint Systems – 11%**

Airbag inspection  
Airbag damage  
Airbag replacement  
Pretensioner

#### **Drive Train - 15%**

Vibration diagnosis  
Noise diagnosis  
Transaxle  
Bent parts

#### **Brakes - 11%**

Brake bleeding  
Brake line  
ABS

#### **Miscellaneous - 7%**

Tire identification  
Wheel diagnosis

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# Mechanic Study Guide

## Motorcycle Repair

### Automobile & Light Truck Repair

#### **Fuel Systems - 21%**

Lean / rich mixture identification  
Causes of a lean mixture  
Causes of a rich mixture  
Exhaust color diagnosis  
Backfire diagnosis  
Carburetor components and operation  
Fuel Injection components and operation  
Spark plug fouling and diagnosis  
Fuel pressure  
Oxygen sensor operation

#### **Measuring and Tools - 11%**

Using Plastigage  
Using a dial indicator  
Using a Volt-Ohm meter  
Using a bore gauge  
Using a feeler gauge  
Using a micrometer  
Shaft run out  
Understanding decimal equivalents up to 1/1000"  
Piston ring end-gap  
Understanding metric system measurements  
Compression / leak down testing

#### **Ignition and Electrical - 20%**

Types of position sensors and their function  
Function of a relay / solenoid  
Function of a stator / rotor  
Function of a regulator / rectifier  
Ignition coil diagnosis  
Splicing electrical connections  
Continuity testing  
Voltage drop  
Parasitic draw  
Diagnosing turn signal circuits  
Alternator output problems

#### **Drive Train - 9%**

Clutch operation and diagnosis  
Transmission shifting problems  
Drive chain diagnosis/repair/maintenance  
Drive Belt diagnosis / maintenance  
Shaft Drive diagnosis / maintenance

#### **Brakes – 9%**

Hydraulic brake system operation / maintenance  
Brake pad wear diagnosis  
Brake rotor diagnosis/repair  
ABS system  
Brake system bleeding

#### **Suspension and Chassis - 10%**

Hydraulic fork diagnosis / repair  
Wheel bearing diagnosis / repair  
Tire replacement  
Stem / neck bearing diagnosis / repair

#### **Engine Repair / Performance - 20%**

Understanding the 4-stroke/cycle engine  
Camshaft operation  
Valve lash diagnosis / adjustment  
Low oil pressure diagnosis/repair  
Worn valve guide diagnosis  
Cylinder bore diagnosis / measurement  
Cylinder deglazing  
Proper cylinder finish  
Head bolt torque sequence  
Piston ring identification  
Bearing / race installation  
Piston slap  
Oil pressure relief valve operation

# Mechanic Study Guide

## Recreational Trailer

### Automobile & Light Truck Repair

#### **Electrical Diagnosis - 36%**

- Trailer tail lamps
- Ground wire problems
- Turn signal circuits
- Determine voltage drop
- Trailer stop lamps
- Brake controllers
- 4-Wire connectors
- Current supply for trailer brakes
- Electrical symbols
- Flasher diagnosis
- Color codes
- Causes of blown fuses
- Current flow / resistance

#### **Brake Diagnosis - 26%**

- Loss of brakes
- Grabby brakes
- Dragging brakes
- Erratic braking, surging
- Pull to one side during braking
- Adjusting trailer brakes
- Brake shoe recognition

#### **Springs/Hitches - 16%**

- Leaf springs
- Equalizing hitches
- Adjustment of hitches
- Types of trailer springs
- Spring maintenance

#### **General Knowledge - 12%**

- Surge brakes
- Reducing sway
- Wheel bearing adjustment
- Hydraulic brake lines
- Metric measurements
- Tire wear diagnosis

#### **Wheels/Hubs - 10%**

- Wheel bearing diagnosis
- Wheel bolt torque pattern

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**Mechanic Study Guide**  
**Breath Alcohol Ignition Interlock Device (BAIID)**  
**Automobile & Light Truck Repair**

**Ohms Law & Electrical Symbol Recognition - 13%**

Ohms Law  
Splice symbol  
Diode symbol  
Relay symbol

**Starting System Diagnosis – 13%**

Starter current draw  
Starter relay diagnosis  
Circuit resistance Test  
Battery test

**Miscellaneous Circuit Diagnosis – 6%**

Regulator diagnosis  
Horn circuit diagnosis

**General – 13%**

Electrostatic discharge  
Voltage drop test  
Circuit protection

**Test Meter Usage – 6%**

Ohmmeter usage  
Voltmeter usage

**Installation/Legal questions**

**Legal Requirements – 25%**

Installer requirements  
Service area requirements  
Customer requirements  
Customer training

**General – 24%**

Violation reset  
Tampering  
Emergency bypass code  
Removal of device  
Set point

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# Mechanic Study Guide

## Engine Repair - Gasoline

## Heavy Duty Truck Repair

### **Engine Mechanical Diagnosis - 26%**

- Spark plug evaluation
- Engine noise
- Compression test
- Oil consumption
- Exhaust smoke color
- Cylinder blocks
- Cylinder heads
- Piston rings
- Overheating

### **Skills In Measuring - 12%**

- Torque angle
- Measuring cylinder bore
- Reading a micrometer
- Reading a dial indicator
- Reading Plastigage
- How to check crankshaft end play

### **Fundamentals – 31%**

- Electrical terms and definitions
- Series / Parallel circuits
- Understanding how engines operate
- Cooling system operation
- Ignition systems
- Camshaft timing
- Fuel systems

### **Electronic Controls – 32%**

- EGR operation
- Variable valve timing
- Sensor operation / diagnosis
- Scan tool operation
- EVAP system

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# Mechanic Study Guide

## Engine Repair – Diesel

### Heavy Duty Truck Repair

#### **Engine Components - 22%**

- Piston rings
- General piston knowledge
- Aftercooler operation
- Oil temperature
- Oil distribution
- Turbo charger operation
- Valve bridge function

#### **Engine Mechanical Diagnosis - 20%**

- Turbocharger diagnosis
- Coolant in crankcase
- Exhaust smoke diagnosis
- Engine operating temperature
- Oil pressure diagnosis
- Engine tear down diagnosis
- Blow by
- Connecting rod diagnosis
- Engine misfire

#### **Fuel Systems - 12%**

- Types of injection
- Leaky fuel lines
- Fuel system diagnosis
- Fuel Filter diagnosis

#### **Skills In Measuring - 10%**

- Measuring tools
- Reading Plastigage
- Reading a micrometer
- Crankshaft end play

#### **Fundamentals - 14%**

- Using a digital multi meter
- Bolt grades
- Understanding 4-stroke engines
- Valve lash adjustment

#### **Electronic Controls and After-Treatment – 22%**

- EGR operation
- DEF function / maintenance
- DPF function / maintenance
- DOC

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# Mechanic Study Guide

## Drive Train

### Heavy Duty Truck Repair

#### **Clutch Components & Diagnosis - 19%**

- Causes of hard shifting
- Clutch pedal free play
- Slipping clutch
- Clutch "chatter"
- Clutch brake
- Pilot bearing
- Clutch adjustment

#### **Driveshaft Components & Diagnosis - 17%**

- Driveline angles
- Driveshaft disassembly
- Driveline vibration
- U-Joint replacement
- U-joint maintenance

#### **Axle Components & Diagnosis - 18%**

- Ring and pinion backlash
- Inter-axle differential lock
- Pinion bearing pre load
- Differential side bearing pre load

#### **Transmission Components & Diagnosis - 46%**

- Torque converter operation
- Planetary gears
- Causes of hard shifting
- Automated mechanical transmission
- Scan tool operation
- Overdrive / underdrive
- Transmission fluid condition
- Clutch disc springs
- Transmission / clutch noise

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# Mechanic Study Guide

## Brakes & Braking Systems

### Heavy Duty Truck Repair

#### **Basic Knowledge - 25%**

- Anti-lock brakes (ABS)
- Stability control system
- Types of Brake line flares
- Hydro-boost systems
- Hydraulic brake line material
- Air brake hand valve
- Drum brake leak diagnosis
- Master cylinder operation
- Preset wheel bearing
- Grease-soaked brake linings

#### **Air Brake Diagnosis & Repair - 58%**

- Air brake systems operation
- Finding air leaks
- Air pressure diagnosis
- Air compressor operation
- Tractor protection valves
- Dual diaphragm brake chamber operation
- Pushrod travel

- Spring brake repairs
- Air pressures for fail-safe brakes
- Adjusting cam actuated brakes
- Brake linkage lubrication
- Air line material
- Slack adjuster and pushrod angle
- "S" cam brake operation
- Air dryer operation
- Trailer brakes won't release

#### **Hydraulic Brake Diagnosis & Repair - 17%**

- Hydro-boost systems
- Swollen master cylinder diaphragm
- Cause of gear lube inside brake drums
- Grabbing brakes
- Causes of a pulsating pedal
- Brake lining wear diagnosis

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# Mechanic Study Guide

## Suspension & Steering Systems

### Heavy Duty Truck Repair

#### **Steering System Diagnosis - 19%**

- Power steering analyzer tool
- Power steering unit noise
- Power steering leak
- System bleeding
- Aerated power steering fluid
- Free play in steering
- Wheel shimmy
- Tie rod end play

#### **Suspension Diagnosis - 19%**

- Air ride suspension operation
- Leaf springs
- Hendrickson suspensions
- Torque rods
- Tandem axle alignment
- Tracking rods

#### **Wheel Alignment - 19%**

- Toe-in adjustment
- Tire inflation
- Tire wear analysis
- Camber / Caster / Toe
- Effects of different angles on vehicle operation

#### **Basic Steering System Knowledge - 19%**

- Front suspension components
- Steering gear operation / diagnosis
- Wheel bearings
- Steering wheel free play
- Steering knuckle wear
- Power steering pump replacement

#### **Basic Suspension Knowledge - 19%**

- Castle nut tightening
- Lug nut tightening sequence
- Walking beam suspension
- Suspension adjustment
- Equalizing beam suspensions
- Adjustable trailer axles

#### **Fifth Wheel Knowledge – 6%**

- Fifth wheel adjustment
- Fifth wheel diagnosis
- Hardware grade

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# Mechanic Study Guide

## Electrical Systems

### Heavy Duty Truck Repair

#### **System Diagnosis - 28%**

- Parallel vs. series
- Trailer light diagnosis
- Relay testing / diagnosis
- Ground faults
- Windshield wiper circuit
- Circuit diagnosis

#### **General - 11%**

- Batteries
- Data bus
- Welding
- Module replacement

#### **Vehicle Lighting – 11%**

- Turn signal circuit
- Tail lamp circuit
- Head lamp circuit
- Trailer wiring
- Clearance lights

#### **Starting & Charging System Diagnosis - 36%**

- Battery charging
- Battery load test
- Alternator output
- Charging system voltage
- Circuit resistance
- Voltage drop test
- Starter diagnosis
- Starter draw test
- Starter terminal identification

#### **Test Methods & Equipment - 14%**

- Voltmeter use
- Ohmmeter use
- Circuit testing
- Diode operation
- High voltage fuel system
- Voltage drop test

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